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Mark Scheme (Results)

January 2022

Pearson BTEC Nationals
In Applied Science (31617H1B)
Unit 1: Principles and Applications of Science I - Biology

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Unit 1: Principles and Applications of Science I

General marking guidance

- All learners must receive the same treatment. Examiners must mark the first learner in exactly the same way as they mark the last.
- Marking grids should be applied positively. Learners must be rewarded for what they have shown they can do, rather than be penalised for omissions.
- Examiners should mark according to the marking grid, not according to their perception of where the grade boundaries may lie.
- All marks on the marking grid should be used appropriately.
- All the marks on the marking grid are designed to be awarded. Examiners should always award full marks if deserved. Examiners should also be prepared to award zero marks, if the learner's response is not rewardable according to the marking grid.
- Where judgement is required, a marking grid will provide the principles by which marks will be awarded.
- When examiners are in doubt regarding the application of the marking grid to a learner's response, a senior examiner should be consulted.
-

Specific marking guidance

The marking grids have been designed to assess learner work holistically. Rows in the grids identify the assessment focus/outcome being targeted. When using a marking grid, the 'best fit' approach should be used.

- Examiners should first make a holistic judgement on which band most closely matches the learner's response and place it within that band. Learners will be placed in the band that best describes their answer.
- The mark awarded within the band will be decided based on the quality of the answer, in response to the assessment focus/outcome and will be modified according to how securely all bullet points are displayed at that band.
- Marks will be awarded towards the top or bottom of that band, depending on how they have evidenced each of the descriptor bullet points.

BTEC Next Generation Mark Scheme

Question Number	Answer	Additional Guidance	Mark
1 (a)	B – Nucleus		1
1 (b)	substitution (1) 4100 / 500 evaluation (1) 8.2 (µm)	award 2 marks for 8.2 ecf	2
1 (c)(i)	Any one from: trachea bronchi bronchioles	accept oviduct/fallopian tube accept singular	1
1 (c)(ii)	beat/expel/move/waft (1) foreign particles/ mucus /pathogens/ovum (1)	accept named substance accept 'egg'	2
		Total	**6 marks**

Question Number	Answer	Additional Guidance	Mark
2 (a)	D- ribosome		1
2 (b)	D – RER→ transport vesicles→ Golgi apparatus→transport vesicles→ plasma membrane		1
2 (c)	Any two from: (SER) synthesises lipids/cholesterol/ phospholipids (1) makes steroid hormones/named steroid hormone (1) absorption and transport of lipids from gut (1) processes/metabolises, toxins/drugs/alcohol (in liver cells) (1) regulates calcium ion concentration (in muscle cells) (1) involved in carbohydrate metabolism (1) Accept any other valid response.	 accept synthesises fatty parts of membranes accept detoxification	2
		Total	**4 marks**

Question Number	Answer	Additional Guidance	Mark
3 (a)	Division (1) 989 / 1433 Evaluation (1) 0.69	award 2 marks for any number that rounds up to 0.7 ecf	2
3 (b)	Award one mark for identification and two marks for linked expansion *identification point* more membrane (1) *expansion points* (therefore) more channels/carriers/ pumps} (1) increasing the efficiency of absorption (1) (so) increases concentration of solutes (1) (which) lowers {water potential/concentration} inside vacuole (1) increasing the {diffusion/osmosis} of {water/ minerals} from the soil (1) increasing mineral availability for synthesis of {amino acids /chlorophyll / middle lamella} (1) improving plant {growth/health} (1)		3
		Total	**5 marks**

<table>
<tr><th>Question Number</th><th>Answer</th><th>Additional Guidance</th><th>Mark</th></tr>
<tr><td>4 (a)</td><td>A – crossbridges

B – ADP

C – ATP</td><td>
accept adenosine diphosphate for ADP

accept adenosine triphosphate for ATP</td><td>3</td></tr>
<tr><td>4 (b)(i)</td><td><table>
<tr><th>feature</th><th>fast twitch muscle fibre</th><th>slow twtich muscle fibre</th></tr>
<tr><td>level of blood supply</td><td>Low/poor</td><td>High/good</td></tr>
<tr><td>concentration of glycogen</td><td>High</td><td>Low</td></tr>
<tr><td>uses oxygen for respiration</td><td>No</td><td>Yes</td></tr>
</table></td><td></td><td>2</td></tr>
<tr><td>4 (b)(ii)</td><td>Award one mark for identification and three marks for linked expansions. Any of the following points may be either identification or expansion depending on how the learner shapes their response.

glycogen contains many glucose molecules (1)

fast twitch

use {anaerobic respiration/glycolysis} (1)

(so) produce less ATP (per glucose molecule) (1)

do not have many mitochondria (1)

glucose is only partly broken down (1)

so many glucose molecules are needed (1)

reduced blood supply requires high glycogen stores to release glucose that is not delivered by the blood (1)

OR</td><td>Accept ORA throughout for slow twitch

accept only yields 2 ATP per glucose molecule</td><td>4</td></tr>
</table>

	slow twitch use aerobic respiration (1) (so) produce more ATP (per glucoses molecule) (1) have many mitochondria (1) glucose fully broken down (1) (so) not as many glucose molecules needed (1) good blood supply delivers glucose (so not necessary to store as much glycogen) (1)		
		Total	**9 marks**

Question number	Indicative content
5	Answers will be credited according to the learner's demonstration of knowledge and understanding of the material, using the indicative content and levels descriptors below. The indicative content that follows is not prescriptive. Answers may cover some or all of the indicative content but learners should be rewarded for other relevant answers. **At point 1** **–70mV** resting potential sodium-potassium pump operating/3 Na+ out for every 2 K + in concentration gradient of sodium ions greater outside axon inside of axon negative with respect to outside/more + ions outside of axon polarised **Between point 1 and –55mV** sodium ion channels open permeability to sodium ions increases sodium ions enter axon by diffusion depolarisation occurs {increased/changed} membrane potential, –70 to –55 mV **At –55mV** threshold positive feedback (more/voltage gated) sodium ion gates open all or nothing response action potential occurs

Mark scheme (award up to 6 marks) refer to the guidance on the cover of this document for how to apply levels-based mark schemes*.		
Level	**Mark**	**Descriptor**
Level 0	0	No rewardable material.
Level 1	1–2	• Adequate interpretation, analysis and/or evaluation of the scientific information with generalised comments being made. • Generic statements may be presented rather than linkages being made so that lines of reasoning are unsupported or partially supported. • The explanation shows some structure and coherence.
Level 2	3–4	• Good analysis, interpretation and/or evaluation of the scientific information. • Lines of argument mostly supported through the application of relevant evidence. • The explanation shows a structure which is mostly clear, coherent and logical.
Level 3	5–6	• Comprehensive analysis, interpretation and/or evaluation of all pieces of scientific information. • Line(s) of argument consistently supported throughout by sustained application of relevant evidence. • The explanation shows a well-developed structure which is clear, coherent and logical.

Ofqual
Llywodraeth Cynulliad Cymru
Welsh Assembly Government
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